



Guide to configure machine signals

Configure RS Production machine signals in a few steps

To simplify the setup and configuration, we have gathered dozens of years of experience in this step-by-step configuration policy.

This document is a decision making guide rather than a guide on how to do specific settings in RS Production. If you're unfamiliar with RS Production's concepts and technology please spend some time with the user documentation available.

[Click here to go to the RS Production user guide](#)

1 – How many Measure Points do we have? (2 of 4)

Symbols and glossary

To make the Measure point inventory we'll use a few simple concepts.

SYMBOLS



Machine
Any Machine



Bottle neck machine
Machine that is cycle time
Bottle neck in a flow

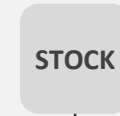


Stock
Any stock

GLOSSARY



Single Machine
A machine with no direct connection to any other machines without passing a stock.



Sub flow
A sub flow is several machines in a series that divided from the rest of the flow by stock in both the beginning and the end of the sub flow.

See examples of more complex sub flows later in this document.

1 – How many Measure Points do we have? (3 of 4)

Count (and name) single machines and cells/lines. Depending on stocks and larger buffers within within a cell/line, each cell/line can either be one or several Measure Points.

Single machines

A single machine is a machine with no direct connection to another machines without passing a stock.

Every single machine is one Measure Point each.

One Measure Point per single machine

Cells and lines

To achieve a full OEE- and disturbance follow up, machine efficiency needs to be measured in every sub flow. See the extensive sub flow type table at the end of the this document to find examples.

Depending on the type of sub flow there will be one or more Measure Points in each sub flow. See the sub flow type table for details.

Buffers within sub flows

Buffers normally don't affect the number of sub flows. It is only when the cycle time bottle neck moves between the two sides of the buffer that there is a need of **one Measure Points on each side of the buffer within the sub flow.**

One or more Measure Points per cell and line

1 – How many Measure Points do we have? (4 of 4)

Where in the sub flow should the Measure point be placed?

A basic rule is to always place the Measure point at the cycle time bottle neck. In a properly designed production flow, the cycle time bottle neck is the same as the most expensive machine investment.

2 – Measure Point configuration questionnaire (2 of 5)

For each Measure Point in the list, go through the following questionnaire and fill in the answers in the five columns.

#1 - Length of series				
#1.1	Do you ever produce more than one piece per production order?	Yes	Serial production	Go to #2.1
		No	Single unit production	Go to #2.1

#2 - Confident with cycle times				
#2.1	Do you have an updated list of real measured cycle times for all articles running on this Measure Point?	Yes	Yes	Go to #3.1
		No		Go to #2.2
#2.2	Do you have a list of set cycle times that is not really measured but more estimated (ie for cost calculation in ERP or similar)	Yes	Yes - BUT you'll need to compensate for your uncertainty by adding extra time on Longest cycle time	Go to #3.1
		No	No	Go to #3.1

Name	Length of series	Confident with cycle times	Average cycle time	Cycle time spread between articles	Maturity in stoppage encoding
Machine M1	Serial	Yes			
Machine M2	Serial	Yes			
Mounting	Single	No			

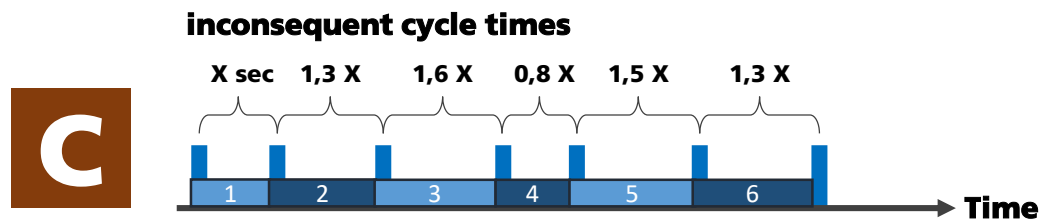
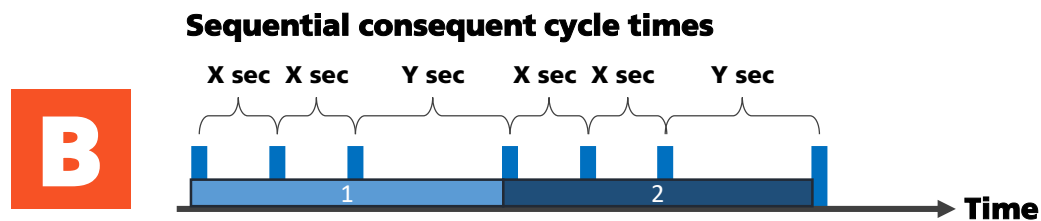
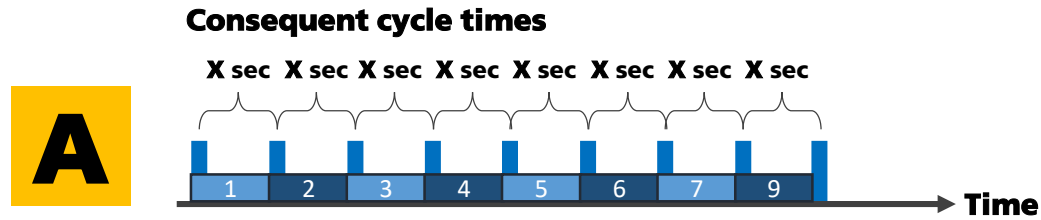
Measure Point list fill-in-example

2 – Measure Point configuration questionnaire (3 of 5)

#3 - Average cycle time			
#3.1	Which of the following illustrations best describes a stable cycle sequence?	A	X (1,2,3 ... in the illustration below) Go to #4.1
		B	Average cycle time in a cycle sequence (1, 2 in the illustration) Go to #4.1
		C	Average cycle time (1,2,3 ... in the illustration below) Go to #4.1

In the next step you will place each Measure Points average cycle time in one of the following four categories

- Approx 10 seconds
- Approx 45 seconds
- Approx 2 minutes
- Approx 10 minutes or more



Name	Length of series	Confident with cycle times	Average cycle time	Cycle time spread between articles	Maturity in stoppage encoding
Machine M1	Serial	Yes	~45 sec		
Machine M2	Serial	Yes	~2 min		
Mounting	Single	No	10 min+		

Measure Point list fill-in-example

2 – Measure Point configuration questionnaire (4 of 5)


#4 - Cycle time spread between articles				
#4.1	Do you run more than one article this Measure Point?	Yes		Go to #4.2
		No	No spread	Go to #5.1
#4.2	The articles on the Measure Point have different cycle times?	Yes		Go to #4.3
		No	No spread	Go to #5.1
#4.3	How big is the difference in cycle times between the fastest and the slowest article you run on the Measure Point?	25%	25%	Go to #5.1
		100%	100%	Go to #5.1
		Significantly more than 100%		Go to #5.1

Name	Length of series	Confident with cycle times	Average cycle time	Cycle time spread between articles	Maturity in stoppage encoding
Machine M1	Serial	Yes	~45 sec	25%	
Machine M2	Serial	Yes	~2 min	100%	
Mounting	Single	No	10 min+	More	

Measure Point list fill-in-example

2 – Measure Point configuration questionnaire (5 of 5)

#5 - Maturity in stoppage encoding				
#5.1	Have the operators who'll be working with disturbance follow up on this machine/cell/line ever been working with downtime follow up before?	No	Low	Go to #6.1
		Yes		Go to #5.2
#5.2	They are familiar with downtime follow up but have never before worked with semi-automatic downtime follow up.	Yes	Med	Go to #6.1
		No		Go to #5.3
#5.3	Have they been working with semi automatic downtime follow up for a longer period of time with no (or very few) uncategorized stop	No	Med	Go to #6.1
		Yes	High	Go to #6.1



Name	Length of series	Confident with cycle times	Average cycle time	Cycle time spread between articles	Maturity in stoppage encoding
Machine M1	Serial	Yes	~45 sec	25%	Med
Machine M2	Serial	Yes	~2 min	100%	Med
Mounting	Single	No	10 min+	More	Low

Measure Point list fill-in-example

3 – Machine signal settings wizard (1 of 2)

The answers from the questionnaire on the previous pages should now be in your Measure Point list.

They will be very helpful to find “best practices” to help you find the machine signal settings in the matrices on the following pages.

For each of the Measure Points in your list, find the corresponding matrix. The first three of the answers helps you to pick the right matrix

- Length of series
- Confident with cycle times
- Average cycle time

Serial production
Confident with cycle times
Average cycle time ~10 sec

		Serial production											
		Confident with cycle times											
		~ 10 sec											
		No spread			+/- 25%			+/- 100%			Significantly more		
		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Set as exactly as possible			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Save time and set per Measure Point instead			Article's best guess cycle time x 1,5			Article's best guess cycle time x 1,5			Article's best guess cycle time x 1,5		
	Set per Measure point	Measure point's average cycle time x 1,5			Measure point's average cycle time x 2,5			Measure point's average cycle time x 4			Measure point's average cycle time x 8		
Limit for production stops		30 sec	60 sec	120 sec	30 sec	60 sec	120 sec	30 sec	60 sec	120 sec	30 sec	60 sec	120 sec
Shortest time between two cycles		2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	1 sec	1 sec	1 sec	0,5 sec	0,5 sec	0,5 sec
		1	2	3	4	5	6	7	8	9	10	11	12

3 – Machine signal settings wizard (2 of 2)

Machine signals

Tells you if will be enough with a single cycle signal for your Measure Point's data collection or if you will need both a cycle signal and running state signal.

Machine signal settings

The other four values are machine signal settings

- Optimum cycle time
- Longest cycle time
- Limit for production stops
- Shortest time between two cycles

Serial production
Confident with cycle times
Average cycle time ~45 sec

Length of series		
Confident with cycle times		
Average cycle time		
Cycle time spread between articles		No spread
Maturity in stoppage encoding		High Med Lo
Machine signals		Cycle signal Cycle signal Cycle signal
Optimum cycle time	Set per Article and Measure Point	Set on Measure po instead
	Set per Measure point	Set as exactly as possible
Longest cycle time	Set per Article and Measure Point	Save time and set Measure Point instead
	Set per Measure point	Measure point's average cycle time 1,5
Limit for production stops		30 sec 60 sec 12
Shortest time between two cycles		2 sec 2 sec 2 s



Machine signal setting matrix (1 of 8)

Serial production

Confident with cycle times

Average cycle time ~10 sec

		Serial production											
		Confident with cycle times											
		~ 10 sec											
		No spread			+/- 25%			+/- 100%			Significantly more		
Machine signals		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
		Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Set as exactly as possible			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Save time and set per Measure Point instead			Article's best guess cycle time x 1,5, always >= 5 seconds			Article's best guess cycle time x 1,5, always >= 5 seconds			Article's best guess cycle time x 1,5, always >= 5 seconds		
	Set per Measure point	Article's best guess cycle time x 1,5, always >= 5 seconds			Article's best guess cycle time x 2,5, always >= 5 seconds			Article's best guess cycle time x 4, always >= 5 seconds			Article's best guess cycle time x 8, always >= 5 seconds		
Limit for production stops		30 sec	60 sec	120 sec	30 sec	60 sec	120 sec	30 sec	60 sec	120 sec	30 sec	60 sec	120 sec
Shortest time between two cycles		2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	1 sec	1 sec	1 sec	0,5 sec	0,5 sec	0,5 sec
		1	2	3	4	5	6	7	8	9	10	11	12

Machine signal setting matrix (2 of 8)

Serial production

Confident with cycle times

Average cycle time ~45 sec

		Serial production											
		Confident with cycle times											
		~ 45 sec											
		No spread			+/- 25%			+/- 100%			Significantly more		
		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Can be problems using only cycle signal		
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Set as exactly as possible			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Save time and set per Measure Point instead			Article's best guess cycle time x 1,5			Article's best guess cycle time x 1,5			Article's best guess cycle time x 1,5		
	Set per Measure point	Measure point's average cycle time x 1,5			Measure point's average cycle time x 2,5			Measure point's average cycle time x 4			Measure point's average cycle time x 8		
Limit for production stops		60 sec	120 sec	180 sec	60 sec	120 sec	180 sec	60 sec	120 sec	180 sec	60 sec	120 sec	180 sec
Shortest time between two cycles		5 sec	5 sec	5 sec	5 sec	5 sec	5 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec

13 14 15 16 17 18 19 20 21 22 23 24

Machine signal setting matrix (3 of 8)

Serial production

Confident with cycle times

Average cycle time ~2 min

Length of series		Serial production											
Confident with cycle times		Confident with cycle times											
Average cycle time		~ 2 min											
Cycle time spread between articles		No spread			+/- 25%			+/- 100%			Significantly more		
Matureness in stoppage encoding		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Needs two machine signals. One machine uptime signal plus one cycle counter signal											
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead				Set as exactly as possible for each article							
	Set per Measure point	Set as exactly as possible				Avoid this, not recommended							
Longest cycle time	Set per Article and Measure Point	Not applicable											
	Set per Measure point	Not applicable											
Limit for production stops		60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec
Shortest time between two cycles		60 sec	60 sec	60 sec	60 sec	60 sec	60 sec	30 sec	30 sec	30 sec	30 sec	30 sec	30 sec
		25	26	27	28	29	30	31	32	33	34	35	36

Machine signal setting matrix (4 of 8)

Serial production

Confident with cycle times

Average cycle time ~10 min+

		Serial production											
		Confident with cycle times											
		~ 10 min+											
		No spread			+/- 25%			+/- 100%			Significantly more		
		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Needs two machine signals. One machine uptime signal plus one cycle counter signal											
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Set as exactly as possible			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Not applicable											
	Set per Measure point	Not applicable											
Limit for production stops		60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec
Shortest time between two cycles		300 sec	300 sec	300 sec	300 sec	300 sec	300 sec	120 sec	120 sec	120 sec	120 sec	120 sec	120 sec

37 38 39 40 41 42 43 44 45 46 47 48

Machine signal setting matrix (5 of 8)

Serial production

Not confident with cycle times

Average cycle time ~10 sec

		Serial production											
		Not confident with cycle times											
		~ 10 sec											
		No spread			+/- 25%			+/- 100%			Significantly more		
		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Avoid this, not recommended			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Save time and set per Measure Point instead			Article's best guess cycle time x 2			Article's best guess cycle time x 2			Article's best guess cycle time x 2		
	Set per Measure point	Measure point's average cycle time x 2			Measure point's average cycle time x 4			Measure point's average cycle time x 6			Measure point's average cycle time x 10		
Limit for production stops		30 sec	60 sec	120 sec	30 sec	60 sec	120 sec	30 sec	60 sec	120 sec	30 sec	60 sec	120 sec
Shortest time between two cycles		2 sec	2 sec	2 sec	2 sec	2 sec	2 sec	1 sec	1 sec	1 sec	0,5 sec	0,5 sec	0,5 sec

49 50 51 52 53 54 55 56 57 58 59 60

Machine signal setting matrix (6 of 8)

Serial production

Not confident with cycle times

Average cycle time ~45 sec

		Serial production											
		Not confident with cycle times											
		~ 45 sec											
		No spread			+/- 25%			+/- 100%			Significantly more		
		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Cycle signal	Can be problems using only cycle signal			Can be problems using only cycle signal		
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Avoid this, not recommended			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Save time and set per Measure Point instead			Article's best guess cycle time x 2			Article's best guess cycle time x 2			Article's best guess cycle time x 2		
	Set per Measure point	Measure point's average cycle time x 2			Measure point's average cycle time x 4			Measure point's average cycle time x 6			Measure point's average cycle time x 10		
Limit for production stops		60 sec	120 sec	180 sec	60 sec	120 sec	180 sec	60 sec	120 sec	180 sec	60 sec	120 sec	180 sec
Shortest time between two cycles		5 sec	5 sec	5 sec	5 sec	5 sec	5 sec	2 sec	2 sec	2 sec	2 sec	2 sec	2 sec

61 62 63 64 65 66 67 68 69 70 71 72

Machine signal setting matrix (7 of 8)

Serial production

Not confident with cycle times

Average cycle time ~2 min

		Serial production											
		Not confident with cycle times											
		~ 2 min											
		No spread			+/- 25%			+/- 100%			Significantly more		
		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Needs two machine signals. One machine uptime signal plus one cycle counter signal											
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Avoid this, not recommended			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Not applicable											
	Set per Measure point	Not applicable											
Limit for production stops		60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec
Shortest time between two cycles		60 sec	60 sec	60 sec	60 sec	60 sec	60 sec	30 sec	30 sec	30 sec	30 sec	30 sec	30 sec
		73	74	75	76	77	78	79	80	81	82	83	84

Machine signal setting matrix (8 of 8)

Serial production

Not confident with cycle times

Average cycle time ~10 min+

		Serial production											
		Not confident with cycle times											
		~ 10 min+											
		No spread			+/- 25%			+/- 100%			Significantly more		
		High	Med	Low	High	Med	Low	High	Med	Low	High	Med	Low
Machine signals		Needs two machine signals. One machine uptime signal plus one cycle counter signal											
Optimum cycle time	Set per Article and Measure Point	Set on Measure point instead			Set as exactly as possible for each article								
	Set per Measure point	Avoid this, not recommended			Avoid this, not recommended								
Longest cycle time	Set per Article and Measure Point	Not applicable											
	Set per Measure point	Not applicable											
Limit for production stops		60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec	60 sec	120 sec	300 sec
Shortest time between two cycles		300 sec	300 sec	300 sec	300 sec	300 sec	300 sec	120 sec	120 sec	120 sec	120 sec	120 sec	120 sec

85 86 87 88 89 90 91 92 93 94 95 96